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Review Article

Barriers to oral health service access for rural and remote Australian children: a mixed-methods systematic review

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Abstract

Introduction: Children living in rural and remote communities experience challenges in dental care access. While several studies have reported barriers contributing to inequalities in services utilisation, a synthesis of evidence is lacking for those underserved children. In this review we explore the barriers and challenges to accessing oral health services among children and families living in rural and remote Australia.

Methods: This review followed the Joanna Briggs Institute methodology for mixed-methods systematic review. We structured our review question using the PICO framework (population: children and their families; phenomena of interest: barriers to oral health service access; context: rural and remote Australia). We conducted a comprehensive literature search across multiple databases, including Medline, Scopus, and Web of Science from December 2024 to January 2025 with no publication-date restrictions. We used the following keywords and Medical Subject Headings: 'children/paediatric', 'barriers', 'accessibility', 'oral/dental health', 'rural/remote areas', and 'Australia'. We complemented database searches with screening the reference lists of included studies and hand-searching in Google Scholar and relevant websites (Australian Institute of Health and Welfare, Australian Bureau of Statistics, and World Health Organization). We included qualitative, quantitative, and mixed-methods studies that reported barriers to children's oral health services in rural and remote

Australia (including Indigenous and non-Indigenous populations). We excluded studies conducted outside Australia, letters to the editor, conference abstracts, opinion articles, and studies on medically compromised children. We imported articles into Covidence for de-duplication, screening, and data extraction by two independent authors. We assessed methodological quality using Joanna Briggs Institute critical appraisal tools and synthesised evidence using a convergent integrated mixed-methods approach.

Results: This review included 31 studies: 12 qualitative, 17 quantitative, and 2 mixed methods. Using the ecological model framework, we organised the barriers into four levels: system, policy, community, and individual. At the system level, geographic distance, limited service availability, and the cost of dental care emerged as significant barriers. At policy level, barriers were restricted access to water fluoridation and insufficient government financial support for oral health care, compared with other health services. At the community level, the impact of social determinants of health, along with the historical cultural oppression, colonisation, and loss of land, reduced both utilisation and confidence in oral health services. At the individual level, low oral health literacy, lack of dental insurance, fear, anxiety, and the presence of multiple competing priorities further discourage care-seeking.

Conclusion: The findings of this review indicate that children in rural and remote communities have historically experienced limited access to dental services. This synthesis of multi-level barriers offers a comprehensive understanding of the complex factors influencing oral healthcare access. Hence, addressing these barriers in isolation is unlikely to be effective, highlighting the need for multi-level strategies.

Keywords

accessibility, Australia, challenges, children, dental services, inequalities, rural communities.

Introduction

The United Nations Convention on the Rights of the Child, in article 24, defines the right to health as the right of the child to the enjoyment of the highest attainable standard of health and to facilities for the treatment of illness[1]. As a signatory, Australia recognises the right of every child to good health and bears the responsibility to advance this health right through legislative measures, policy development, and strategic planning, thereby incrementally ensuring universal and equitable health coverage. Oral health is a vital component of overall health and wellbeing and should be fully considered in the roadmap towards achieving health equity[2]. Australia's key policy for children's dental health, particularly for disadvantaged families, is the Child Dental Benefits Schedule, a federal means-tested program offering children aged 0–17 years capped benefits for basic dental services including examinations, X-rays, cleaning, fissure sealing, fillings, root canals, extractions, and partial dentures[3]. The National Oral Health Plan also targets priority groups, including low-income families and those in remote areas, aiming to reduce oral health inequities[4].

While the overall oral health of Australian children has improved, certain identifiable groups continue to experience a disproportionate burden of oral disease[5,6]. Children in rural areas experience poorer oral health-related quality of life and higher caries risk than those in metropolitan areas[6]. The National Child Oral Health Study (2012–14) reported caries in primary teeth in 53% of children in remote/very remote areas versus 39% in major cities[7]. Consistent with this, dental visiting in 2023–24 was lower outside metropolitan areas (55.3% in major cities v 46.2% in outer regional, remote and very remote regions)[8]. Disparities are particularly pronounced for Aboriginal children, who experience dental caries threefold higher than non-Aboriginal children[6], and a substantial proportion reside in rural and remote Australia (19.0% in outer regional areas and 15.4% in remote/very remote areas)[9].

In Australia, rural and remote settings are commonly defined using the Australian Statistical Geography Standard Remoteness Areas (RAs), which classifies locations into five categories based on the Accessibility/Remoteness Index of Australia Plus (ARIA+). This index fundamentally measures remoteness as a proxy for access to essential services by calculating the road distance from a given location to various population centres. The classification moves from Inner Regional (RA2) and Outer Regional (RA3), which experience moderate service access, to Remote (RA4) and Very Remote (RA5), where the greatest geographic distance is associated with the lowest levels of service availability[10].

Poor oral health in rural and remote areas is a complex issue driven by limitations in dental care access[4,8]. Evidence indicates that improving access to primary care results in better health outcomes and reduces preventable hospitalisation[4,11]. In health services and policy research, access is commonly conceptualised using the Penchansky and Thomas (1981) framework, which comprises five dimensions[12]:

- *availability* – refers to the adequacy of dental service supply in relation to needs
- *accessibility* – addresses the geographic proximity of services
- *accommodation* – involves health services organisations and responsiveness to meet the population's needs and preferences, including appointment flexibility, and culturally appropriate delivery for Indigenous and non-Indigenous populations[13]
- *affordability* – considers direct and indirect cost of services, including travel and lost income[14]
- *acceptability* – concerns the compatibility between patients' expectations and providers' attributes, including cultural sensitivity, trust in the healthcare system, and the comfort level experienced during interactions[15,16].

In rural and remote Australia, children and their families face compounded barriers across these dimensions, contributing to persistent oral health disparities. Addressing these disparities requires a comprehensive understanding of the influencing factors. This systematic review applied an ecological model, exploring barriers at system, policy, community and individual levels that influence regular dental visits. In public health research, an ecological model is a framework that explores the complex interplay of various factors influencing health and wellbeing at multiple levels. It emphasises that health behaviours are not solely influenced by personal characteristics but are also shaped by community, policy and organisational factors[17]. We aim to synthesise the existing literature, using a mixed-methods approach, to identify multi-level barriers and propose evidence-based solutions tailored to the unique challenges of these communities.

Methods

We conducted a mixed-methods systematic review, incorporating qualitative, quantitative and mixed-methods studies to yield complementary insights, as studies focus on different aspects of the phenomena of interest: barriers to oral care. Quantitative studies, such as cross-sectional or cohort designs, established patterns and prevalence of dental utilisation within specific populations. Conversely, qualitative data derived from methods like focus groups and interviews offered in-depth explanations for these observations. This convergent, integrated approach facilitated a comprehensive, pooled synthesis of the diverse data types[18]. Detailed findings were derived through this integrated mixed-methods approach, which specifically addressed the research question by transforming quantitative outcomes into qualitative interpretations. The ultimate synthesis is presented in a narrative format. This review follows the Joanna Briggs Institute (JBI) methodology for mixed-methods systematic review[18]. A protocol for this review was developed and registered in the PROSPERO systematic review registry (CRD420250625809).

Search strategy

First, we conducted a preliminary search of MEDLINE and Scopus to identify keywords from relevant titles and abstracts. Then, we used these keywords and Medical Subject Headings (MeSH) terms to develop a full search strategy for MEDLINE, which was customised for each database. We conducted the final search across MEDLINE (via Ovid), Scopus and Web of Science between December 2024 and January 2025 using the following MeSH and keywords: [(Austral* or qld or Queensland or new or 'New South Wales' or vic or Victoria or tas or Tasmania or sa or 'South Australia' or wa or 'Western Australia' or nt or 'Northern Territory' or act or 'Australian capital territory') AND ("rural areas" or "rural regions" or "remote areas" or "remote regions" or "rural Australia" or 'geographic perspective') AND (children or child* or adolescent or adolescence or teenager or teenagers or 'paediatric patients' or childhood or 'Aboriginal children' or 'Torres Strait Islander children' or Indigenous) AND ("oral health" or dentistry or dental or "dental care" or "oral care" or "oral health services" or "dental services" or "dental treatment" or "oral treatment" or "emergency care")] (Supplementary figure 1). We complemented the database search with hand-searching in Google Scholar, and on relevant website, including the Australian Institute of Health and Welfare, Australian Bureau of Statistics, and WHO. Additionally, we screened the reference lists of included articles for additional relevant articles. We applied no publication-date restrictions, as barriers to oral health care in rural and remote communities represent a longstanding structural issue rather than a recent phenomenon.

Selection criteria

In accordance with the JBI guidance, we structured our review question using the PICO (population, intervention, comparison, outcome) framework. The population of interest comprised children and their families. The phenomenon of interest focused on the barriers affecting access to oral health service, and the context was rural and remote communities across Australia. The review includes both Indigenous and non-Indigenous Australians. We did not apply any age limits, but we focused on children's access to dental care. We excluded letters to the editor, conference abstracts, opinion articles, studies conducted outside Australia, and articles that focused on medically compromised individual in rural communities.

Study selection

We exported all retrieved articles that met inclusion criteria into Covidence, and removed duplicate records. Two authors independently screened the titles and abstracts in Covidence for inclusion of relevant studies, followed by a full-text assessment based on the predefined inclusion and exclusion criteria. We documented the reasons for exclusion during full-text screening in the PRISMA diagram. A third author resolved any disagreements through discussion. The results of the full search and the article inclusion process were reported in the PRISMA flow diagram (Fig1)[19].

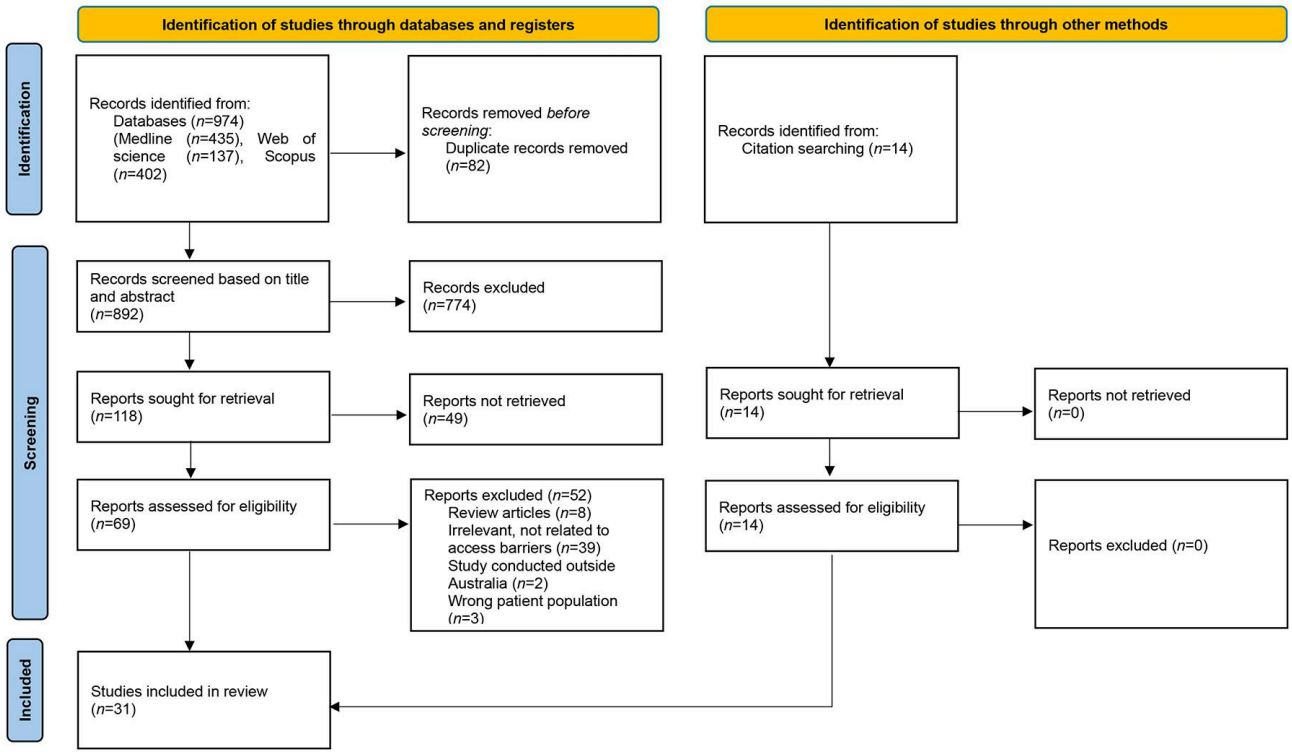

Figure 1: PRISMA flow diagram of full search and article inclusion process.

Assessment of methodological quality

This systematic review used the JBI critical appraisal tools[20]. We appraised quantitative studies, including the quantitative component of mixed-methods studies, using the JBI critical appraisal checklist for analytical cross-sectional studies. We evaluated qualitative studies, including the qualitative component of mixed-methods studies, using the JBI critical appraisal checklist for qualitative research. Using the checklist responses 'yes', 'no', and 'unclear', we critically appraised all studies, regardless of methodological quality. Two reviewers independently completed the critical appraisal and a third author resolved any disagreements through discussion.

Data extraction

Two independent reviewers extracted data for all included studies in Covidence, following a convergent integrated approach[18]. The research team developed a customised data-extraction template to guide the process, track key information efficiently, identify emerging themes relevant to the review question, and organise all extracted data. We extracted study characteristics including first author, year of publication, state/territory, study design, study setting, sampling technique, and participants' information (age, sample size, Indigeneity, and gender). We also recorded levels of impact at which barriers were reported.

Data transformation

We transformed quantitative data into qualitised data. This involved transformation into narrative interpretations of the quantitative results. We applied this same transformative approach to the quantitative aspects of mixed-methods studies.

Data synthesis and integration

This review used a convergent integrated approach for data synthesis, following the JBI methodology for mixed-methods systematic reviews[18]. We assembled and pooled the qualitised data from transformed quantitative studies together with the qualitative data. Then, we categorised the synthesised results and linked them based on similarity in meaning to construct a cohesive argument. This synthesis of findings yielded a comprehensive overall analysis.

Ethics approval

We conducted this systematic review in compliance with the guidelines and standards established by the Committee on Publication Ethics. Given the nature of the study, we did not require ethics approval from institutional ethics committee.

Results

Our search identified 974 articles. We removed 82 duplicates and screened the remaining records. Subsequently, we excluded 774 articles based on title and abstracts screening and a further 49 papers after full-text review. This process resulted in 17 studies that met the inclusion criteria. Although we searched Google Scholar, Australian Institute of Health and Welfare, Australian Bureau of Statistics, and WHO resources, none of the records identified through these resources met the inclusion criteria. We identified an additional 14 studies through citation searching of the included articles, bringing the final number of included studies to 31 (Fig1). These studies form the foundation for the systematic assessment of barriers to accessing oral health services in rural and remote Australia.

Study characteristics

Included studies were geographically diverse, spanning multiple Australian states and territories, including New South Wales, South Australia, Western Australia, Victoria, Northern Territory, Queensland (Fig2). Studies used a range of methodologies, involving qualitative interviews/focus groups, cross-sectional surveys, prospective cohort designs, secondary analysis of large administrative datasets, mixed-methods and descriptive case studies. Participants included non-Indigenous and Indigenous children and their carers, community members, and healthcare/dental professionals working in rural and remote communities. Age eligibility varied from paediatric samples (≤15 years) to adult samples of 18–98 years. Sample sizes ranged from small qualitative samples (eg 12 interviewees) to very large population-based datasets (eg 43,937 hospitalised children) (Table 1). Almost all included studies employed appropriate research methodologies. The assessment indicated that only one study had a high risk of bias[21]. Twelve studies were assessed as having a moderate risk of bias[2,5,13,22-30], and 18 studies had a low risk of bias[14-16,31-45]. Five studies did not report confounding variables[2,5,21,24,29], seven qualitative studies failed to locate the researcher culturally or theoretically[13,22,23,26-28,31] and seven studies didn't describe the influence of the researcher on the research[13,22,23,26-28,39]. The detailed results of the quality assessment are presented in Supplementary table 1 and Supplementary table 2.

Table 1: Descriptive characteristics of included studies

Authors, year of publication	State/territory	Study design	Setting	Sampling technique	Participants	Age (years)	Total sample size	Indigenous status (Aboriginal or Aboriginal and Torres Strait Islander)	Gender	Barrie level
Gardiner et al, 2020[5]	Victoria NSW, NT, WA	Prospective cohort study	Rural and remote regions with a Royal Flying Doctor Service Dental service within a 60-minute drive time	Royal Flying Doctor Service dataset	All patients who accessed an Royal Flying Doctor Service dental clinic in rural and remote regions	1–85 or more; mean age 31.5 (standard deviation 24.8)	3407 patients	27% Indigenous, 43% non-Indigenous, 30% patients had missing data for ethnicity	33% men, 38% women, and 29% of unknown sex	Syster level

Barnett et al, 2015[23]	Queensland	Qualitative semi-structured individual and group interviews	Four remote communities in outback Queensland, Australia in which there was no resident dentist/dental surgery	Purposive and snowball sampling strategies	Primary and oral healthcare providers with experience in oral care in rural and remote communities	18–40 or more	35 primary care providers (12 GPs, 6 pharmacists, 4 practice manager, 3 child health nurse or nurses, 3 managers/directors of nursing, 3 receptionists, 3 medical students, 1 speech therapist) 4 dental care providers (3 dentists, 1 dental nurse)	nr	24 female and 15 male	Syster policy comm indivic levels
Alsharif et al, 2014[45]	WA	Cross-sectional study	Records of hospitalised children because of oral-related conditions	Western Australia Hospital Morbidity Dataset	Child under the age of 15 years diagnosed and admitted for an oral health condition in WA for the study period	0–14	43,937 children	5% (2,119)were Indigenous children, 41,818 non-Indigenous children	nr	Syster level
Jean et al, 2020[2]	National	Cross-sectional study	Public dental clinics providing services for children	Publicly available information on government health service websites	All residents under 18 were included in the study in line with the UN Convention on the Rights of the Child definition of a child	<18	nr	nr	nr	Syster level
Barnett et al, 2017[26]	Queensland, SA, Tasmania	Qualitative semi-structured individual and group interviews	Rural communities across three Australian states. Classified as RA2 (Inner Regional Australia), RA3 (Outer Regional Australia), RA4 (Remote Australia) or RA5 (Very Remote Australia) by the Australian Standard Geographical Classification Remoteness Areas	Purposive and snowball sampling strategies	Primary care providers and dental practitioners in rural and remote areas	Mean age 40	14 communities identified in the study. 105 primary care providers (1 speech therapist, 3 allied health workers, 3 Aboriginal Health Workers, 21 child health nurses or nurses, 12 directors of nursing, 30 GPs, 19 pharmacists, 9 practice managers, 7 receptionists) 12 dental providers (8 dentists, 1 dental therapist, 2 dental assistants, 1 practice manager)	nr	74 (70%) female, 31 (29.5%) male	Syster policy, comm indivic levels
Patel et al, 2021[40]	WA	Qualitative individual interviews and yarning groups	East Kimberley region of WA	Purposive sampling with the assistance of Aboriginal liaison officers enabled invitation of participants leading to a heterogenic sample	Aboriginal adults over 18 and living in the Kimberley region of WA	>18	Total of 80 participants 23 individual interviews and 17 yarning groups	Aboriginal	27 males, 53 females	Syster policy, comm indivic levels
Marino et al, 2021[42]	Victoria	Cross-sectional study including face-to-face survey and clinical assessment of oral health	Regional centre and three adjacent shire capitals in the Goulburn Valley of regional Victoria	Randomly selected households	Population living in the Goulburn Valley region of Victoria	Mean age 58.6 (standard deviation 16.3), ranging from 18 to 98	574 participants	nr	55.3% female, 44.7% male	Syster indivic levels

Irving et al, 2017[24]	NSW	Cross-sectional survey	Northern Central Tablelands of NSW	All Aboriginal children attending the new collaborative oral health service in the communities were eligible for participation in the study	Aboriginal children aged 4–14 attending the new collaborative oral health service in the community	4–14	49 children aged 4–14 participated in the study (with parents/guardians)	Aboriginal children	63% female, 37% male	Syster indivic levels
Barnett et al, 2016[28]	Queensland, Tasmania, SA	Qualitative face-to-face semi-structured interviews	Rural and remote communities in which oral health care was a significant problem, and where there was no resident dentist	Purposive and snowball sampling strategies	Primary care providers in remote communities, who had experience in advising patients with oral health problems	Mean age 40	16 communities were identified by state dental officers for inclusion, and 30 GPs	nr	22 male, 8 female	Syster policy, comm indivic levels
Gussy et al 2006[31]	Victoria	Qualitative focus group discussions and semi-structured interviews	Four rural, non-fluoridated local government areas in Victoria	Purposive and snowball sampling strategies	Maternal and child health nurses, GPs, dental practitioners (dentists, dental nurses, and dental practice managers), and paediatricians	nr	A total of 56 participants (18 maternal and child health nurses, 9 GPs, 7 paediatricians, 22 dental professionals) 11 focus groups and 5 semi-structured interviews	nr	nr	Syster policy, indivic levels
Tynan et al, 2022[36]	Queensland	Qualitative focus group discussions and semi-structured interviews	Rural community in Queensland with a predominantly Aboriginal population	Participants were purposively recruited from established health and community groups.	Community members and community leaders of Aboriginal and Torres Strait Islanders who were engaged in health and community groups	nr	27 participants. 12 in depth-interviews and 3 focus groups	Aboriginal and Torres Strait Islanders	nr	Syster policy, comm indivic levels
Jamieson et al, 2008[27]	SA	Qualitative focus group discussions	Rural community of Indigenous Australians in mid-north region of SA	participants were chosen purposively, in a strategic manner, to capture the diversity and breadth of oral health knowledge across different age-groups and cultural backgrounds in the community with relative homogeneity in regard to age and background	Members of a local Indigenous arts and crafts group, a diabetes awareness group that operated through the Aboriginal-owned health centre, a young mothers' Indigenous childcare group and a group of Indigenous Healthcare Workers	21–72 (female), 55–65 (male)	34 participants	Indigenous	30 female, 4 male	Syster comm indivic levels
Walker et al, 2023[16]	Queensland	Qualitative semi-structured individual and group interviews	A small, rural Indigenous community in Queensland with 1300 people	Purposive and snowball methods	Rural Indigenous community members	Four participants aged 18–39, with the remaining 23 aged >40	27 community members. Three focus groups and 12 in-depth interviews were completed	95% Aboriginal and 2.5% identifying as both Aboriginal and Torres Strait Islander	10 male and 17 female	Syster policy, comm indivic levels

Toh et al, 2022[37]	National	Secondary analysis of data from the Longitudinal Study of Indigenous Children	Data from the Longitudinal Study of Indigenous Children, a longitudinal population-based cross-sectional study in Australia. Covers all of Australia's states and territories, inclusive of urban, regional and remote areas	A cluster sampling technique was used to select geographic sites. Data were collected from primary caregivers	Australian Indigenous children	nr	1258 children	87.1% Aboriginal children, 6.8% Torres Strait Islander, 6.1% Aboriginal and Torres Strait Islander	49.1% male, 50.1% female	Syster indivic levels
Dickson-Swift et al, 2023[29]	Victoria	descriptive design and case study	Rural Victorian towns with over 1000 population (Barwon Southwest, Loddon Mallee, Hume, Gippsland and Grampians)	nr	Rural Victorian towns with over 1000 population that did not have water fluoridation	N/A	66 towns	N/A	N/A	Policy
Jones et al, 2016[39]	SA	Qualitative semi-structured interviews	People referred for oral care through the Aboriginal Liaison Program of the SA Dental Service	Purposive sampling method	Aboriginal population eligible for publicly funded dental care	nr	49 participants	Aboriginal	18 males. 26 females	Policy, indivic levels
Ellershaw, 2005[21]	National	Cross-sectional survey	National Dental Telephone Interview Survey 2002	Random sample. Records were stratified by state and region and a random sample of telephone numbers were selected from each stratum	Residents from all states and territories of Australia	≥5	7312 participants	nr	nr	Syster level
Dimitropoulos et al, 2018[25]	NSW	Quantitative cross-sectional study	Schools and local health centre for Aboriginal communities in three small, rural and remote communities	nr	Aboriginal children aged 5–12 enrolled in local schools, parents/guardians, school staff and community health workers	Children aged 5–12, parents/guardians and school staff and health workers (20)	88 children were screened and 78 completed the child's oral health questionnaire, 32 parents and/or guardians, and 37 school staff and 2 community health workers	Aboriginal children	Children(39 male, 49 female), parents/guardians (4 male, 28 female), school staff and health workers (12 male, 27 female)	Syster indivic levels
Curtis et al, 2007[33]	NSW	Cohort study nested within a clinical trial	nr	Self-administered questioner mailed to each study participant within 1 month of recruitment into the clinical trial	Patients recruited for clinical trial study	43–46	823 participants	nr	57% female in major city, 63% female in regional area, 47% in remote area	Syster indivic levels

Simmons et al, 2006[32]	Victoria	Cross-sectional study using qualitative and quantitative methods, face-to-face and self-reported household survey	Household in regional (rural) centre and surrounding smaller towns in rural Victoria	Stratified random sampling design	All members of the household were invited to participate	≥16	3172 participants from regional centre; 3144 from shire capitals (small towns)	European descent, Aboriginal, and Iraqi	56.7% female	Syster policy, indivic levels
Adams et al, 2004[38]	WA	Quantitative cross-sectional telephone survey	Urban, rural, and remote locations in WA	Random selection of participants' telephone number using the electronic White Pages phone directory	Participants aged 60 or more, had a telephone listing, were on the State Electoral Roll and lived in non-institutionalised accommodation and who were able to speak English sufficiently	≥60	2100 participants	nr	Urban: 415 female and 351 male; rural: 413 female and 345 male; remote: 239 female and 255 male	Syster indivic levels
Jones et al, 2014[34]	SA	Quantitative cross-sectional survey	Rural-dwelling Indigenous Australians	Convenience sampling	Aboriginal or Torres Strait Islander aged 17 or older living in a regional centre about 230 km north of Adelaide, the capital of SA	≥17; mean age 38	468 participants	Aboriginal and Torres Strait Islander	83 male, 385 female	Syster indivic levels
Jamieson et al, 2006[30]	NT	Quantitative cross-sectional survey	Three remote communities in the Top End of the NT	Random sampling approach	Carers of Indigenous children in remote communities in the target age range	4–12	214 carers completed questionnaires for 409 children	Indigenous children	nr	Policy, indivic levels
John et al, 2017[44]	NSW	Secondary data analysis of a cross-sectional survey	Rural community of Lithgow, NSW	nr	Primary school children and their parents	Children 6-13	667 parents completed the survey	Indigenous and non-Indigenous	336 male, 329 female	Comm indivic levels
Nolan-Isles et al, 2021[15]	NSW	Qualitative semi-structured interviews	Regional and remote communities in NSW	Snowball sampling	Healthcare delivery staff and stakeholders	nr	31 interviews	Aboriginal and non-Aboriginal	nr	Syster policy, comm indivic levels
Kelly et al, 2014[13]	SA	Qualitative semi-structured interviews	SA rural and remote health services and tertiary hospitals	nr	Health professionals from urban, rural, and remote regions; patients/carers, Aboriginal Elder women	nr	88 participants	Aboriginal and non-Aboriginal	nr	Syster policy, comm indivic levels
McBain-Rigg and Veitch 2011[22]	NSW	Qualitative semi-structured interviews	Mount Isa, Queensland	Interviewees were purposively chosen for their personal experiences, and ability to identify potential barriers for Aboriginal people	Aboriginal and Torres Strait Islanders people, Aboriginal Health Workers and other health professionals	nr	12 interviews	Aboriginal and Torres Strait Islanders and non-Indigenous health workers	nr	Syster policy, comm indivic levels

Patel et al, 2015[35]	WA	Quantitative and qualitative cross-sectional study	Remote Kimberley region of WA	An online survey was sent to all volunteers working with the Kimberley Dental Team	Volunteers working with the Kimberley Dental Team including dentist, dental nurse, dental student, dental specialist, and other non-dental practitioner volunteers who held administrative and community liaison positions	18–68; median age 47.5	42 participants	nr	28 (68%) female, 13 (32%) male	Syster policy, indivic levels
Kruger et al, 2008[14]	WA	A cross-sectional survey and dental examinations was carried out	Rural and remote communities in the Kimberley region of WA	Random selection of participants through the help of workers in all the communities. Every third adult on the Kimberly Aboriginal Medical Services Council computerised health information system was listed. About 15% of the total participants were not randomly selected but attended the clinic through the publicity in each community	Adult members of four selected communities	18–88, the mean age 41.2% (standard deviation 18.0)	208 Aboriginal adults	Indigenous adults	134 female, 74 male	Syster level
Crocombe et al, 2022[43]	National	Cross-sectional study	Three regional levels (Major city, Inner regional, Outer regional and Remote/Very remote) were used	Data from the latest National Study of Adult Oral Health (2017–18). Study participants were selected using a multi-stage probability sampling design that began with the sampling of postcodes within states/territories in Australia	Adults in major cities, regional, and remote communities	15–60 or more	15,731 people interviewed, 5,022 were examined	Indigenous and non-Indigenous	50.2% female, 49.7% male	Syster policy, indivic levels

Williams et al, 2010[41]	SA	Cross-sectional study	Port Augusta Aboriginal community	Convenience sample, included word of mouth, attendance at health promotion sessions and community centres, the waiting room of the health service, interviews on radio, flyers, street stalls, home visits and Indigenous Health Worker contact	Indigenous, lived in the Port Augusta region and aged ≥17	≥17, mean age 38	468 participants	Indigenous adult	36.9% female, 31.1% male	Syster indivic levels

NSW, New South Wales. N/A, not applicable. nr, not reported. NT, Northern Territory. RA, Remoteness Area. SA, South Australia. WA, Western Australia.

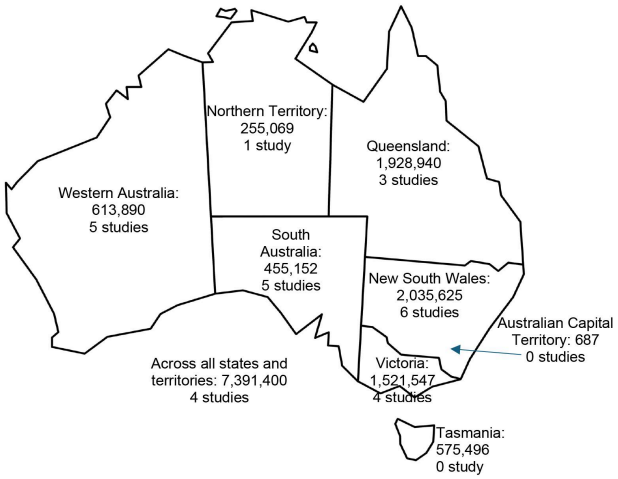

Figure 2: Estimate resident populations of rural and remote areas and number of studies reporting barriers to accessing oral health services. Population counts obtained from Australian Bureau of Statistics[46].

Synthesis of findings

It is important to highlight that the barriers to access are not independent factors; rather, they often interact with and influence one another, and their impact can vary from person to person. To capture this complexity, we developed an ecological model that illustrates the interplay of barriers across multiple levels, including system, policy, community, and individual levels (Fig3).

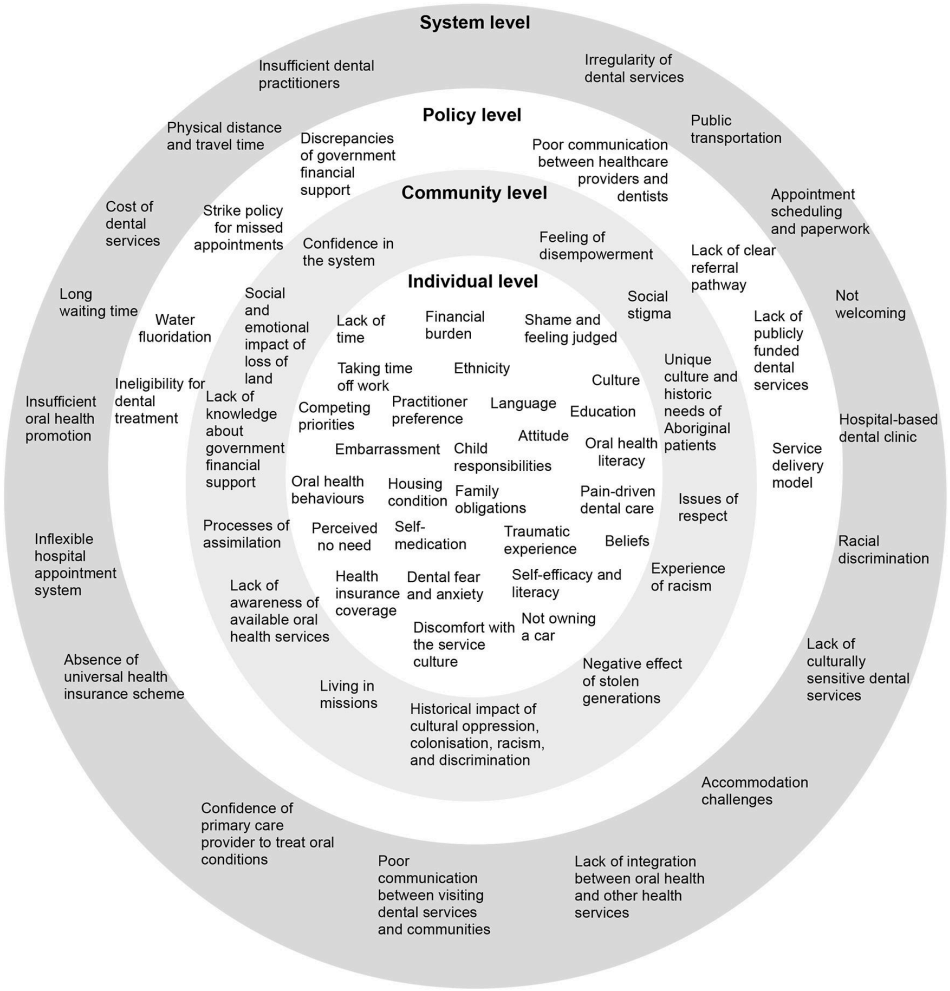

Figure 3: Ecological model of barriers to accessing oral health care in rural and remote areas within Australia.

Potential barriers at system level

Twenty-seven studies emphasised challenges related to the health system.

Geographic location and transportation

The most frequently identified system-level barrier was the geographic location and physical distance of oral health services. Many communities in rural and remote areas lack dental coverage within a 60-minute drive, with some residents required to drive 2–4 hours to access dental services[2,13-16,22-25,31-37]. Compounding the challenge of distance is the issue of transportation, where personal vehicle ownership is low and public transport options are often limited or non-existent[13,15,16,22-26,34,36-40]. Even where community transport service exists, it presented several limitations, such as inflexible schedules, a limited number of seats allocated for dental appointments, and the exclusion of children who required car seats[15,36].

Appointment systems and waiting times

Difficulty aligning appointment times with fixed public transport schedules is another challenge for rural and remote individuals accessing health services in a major city, as they must navigate two inflexible systems: healthcare scheduling and public transport timetables[13,22]. Additionally, administrative requirements, including paperwork and formal appointment processes, often caused patients to lose access to oral care, even when they had already organised travel and accommodation. This barrier was particularly pronounced in remote communities, where unfamiliarity with administrative procedures further impeded timely dental attendance[40]. Long waiting periods also emerged as significant barriers to accessing dental services[24,27,31,32,36-38,40].

Cost of dental services and absence of universal health insurance coverage

Affordability of dental care is another barrier that can prevent individuals in rural and remote areas from accessing dental services[14,16,21,22,24,26-28,31,32,34-39,41-43]. Compounding direct costs are the substantial indirect expenses associated with accessing oral health services. These include fuel cost, potential accommodation for overnight stays, and lost income for time off work, which disproportionately burdens families[13,16,22,23,26,33,36,39]. Although the Patient Assistance Transport Scheme offers limited financial reimbursement, it does not cover all out-of-pocket expenses[13].

Workforce

The literature extensively reported the challenges associated with the recruitment and retention of dentists in Australia's rural communities[14,23,26,35,37,43]. Hence, in the absence of a resident dentist, individuals in rural and remote communities present to local hospitals, GP practices, pharmacies and Aboriginal Health Centres with a range of oral health problems[23,26]. However, the scope of care provided is limited to oral hygiene instructions, short-term pain relief, antibiotic prescriptions, and advice to patients to see a dentist[23,26]. Some primary care providers acknowledged a lack of confidence in managing patients presenting with oral health issues[23,26,31]. Similarly, some dentists

working in these communities were reluctant to treat young children, which posed a significant barrier to timely dental care for this vulnerable group[31].

Visiting oral health services

The infrequent and inconsistent provision of dental services in rural and remote areas, characterised by the absence of a fixed oral healthcare setting or consistent dental practitioners, was perceived as unsustainable and detrimental to building trust-based relationships between patients and healthcare providers[15,16,22,26]. Compounding this was the scarcity of community and school-based oral health promotion activities[16,28,31]. Jamieson et al identified five key reasons for the under-utilisation of visiting school dental services in rural and remote communities: limited community awareness of preventative dental measures, difficulties in obtaining consent for child dental care, high mobility among children, low school attendance limiting opportunities for school dental service delivery, and the short duration of school dental service visits[27].

Acceptability of oral health services

A lack of culturally sensitive dental services and providers was consistently identified as a barrier to accessing oral care among Aboriginal and Torres Strait Island communities. Participants reported feeling misunderstood, judged, or disrespected by dental professionals who lacked awareness of their cultural background[15,16,24,27,35,39]. Furthermore, the integration of dental clinics within main hospital facilities inadvertently introduced stigma, as hospitals are often associated with illness, trauma, or negative past experiences, particularly for Aboriginal and Torres Strait Islander individuals. This can deter attendance for routine dental care[35,40].

Potential barriers at the policy level

Eleven studies documented the presence of policy-level barriers to oral health access.

Government funding

The literature highlights significant discrepancies and insufficient government financial support for oral health care, compared to other health conditions, creating a major barrier to accessing dental services. Notably, many dental services also fall outside the scope of subsidised health programs[16,23,35].

Ineligibility for dental treatment

The restrictive eligibility criteria for accessing public dental care, with only individuals holding government healthcare cards or concession cards qualifying for subsidised dental treatment, excludes a substantial group of individuals with low income levels who do not meet the strict criteria for these cards but still cannot afford private dental treatment[27,28,39,43]. In addition, the implementation of strike policies in some regions, whereby individuals are denied further appointments after two missed visits, further acts as a barrier to dental care[39].

Professional communication and integration of health services

Poor interprofessional communication both between primary healthcare providers and either visiting or regional dental practitioners, and between visiting dental professionals and the local community, emerged as a significant barrier. This deficit in communication led to reduced community awareness regarding the availability of oral health services, including visiting dental services, school dental services, and the mobile dental van[15,22,23,26,28]. Furthermore, unclear referral pathways and the absence of structured feedback process limit coordinated patient care[23,26,28]. A lack of coordination and integration between oral health and other healthcare services also contributes to fragmented care, with many health practitioners not incorporating oral health consideration when diagnosing or managing systemic conditions like diabetes[15,16,22].

Lack of access to water fluoridation

Studies identified limited access to water fluoridation in rural and remote communities as a policy-level barrier that contributes to higher caries risk and widens oral health inequalities[29].

Potential barriers at the community level

Eleven studies present findings related to community-level barriers.

Racism and discrimination

Several studies reported that fear of racism, discrimination, judgement, disrespect, and negative government intervention act as barriers to Aboriginal and Torres Strait Islander communities when accessing health services[15,24,36]. Aboriginal parents also expressed concern about potential involvement from the Department of Child Services in New South Wales and about being perceived as a bad parent[15].

Cultural practices

Oral health behaviours were not traditionally embedded within the lifestyle of Aboriginal and Torres Strait Islander communities, which may influence present-day practices[27]. Therefore, there was a lack of understanding at a community level about oral hygiene measures required for good oral health[27]. Also, social stigma associated with poor oral health discourages individuals from seeking timely treatment, as many avoid disclosing the condition of their mouth[36].

Community awareness

Limited awareness of the location of oral healthcare services, how they operate, and what government financial support is available commonly prevents individuals from accessing dental care[13,16,22,32,39].

Potential barriers at the individual level

Twenty-five studies highlight individual-level barriers as a major issue.

Parents' knowledge and attitude

A lack of oral health knowledge and poor hygiene practices among parents[22,23,26,39], in particular a limited understanding of the importance of early dental care, can delay or prevent necessary treatment for their children[31]. Factors such as parents' educational levels, employment status, ethnic backgrounds, and cultural beliefs further influence their health-seeking behaviours[35,44].

Low priority

Rural community members often perceive oral health as a low priority and typically seek dental care only when severe pain arises[15,23-25,27-29,31,32,36-40,42-44], or when aesthetic concerns negatively affect their self-esteem and quality of life[39]. Also, the presence of multiple competing priorities, such as medical conditions, lack of time, family responsibilities, and other personal commitments make it difficult to prioritise or attend dental appointments[13,15,32,36,38,39,42]. For Aboriginal and Torres Strait

Islander Peoples, cultural obligations during times of bereavement Sorry Business can also delay or prevent engagement with oral health services[15].

Financial burden

Key challenges in preventing oral diseases among children in rural and remote communities are closely associated with financial constraints and broader socio-environmental factors within households[30,36]. Limited financial resources often restrict access to basic oral care items, such as toothbrushes and toothpaste, thereby impeding the development of consistent oral hygiene practices[16,24,36]. Low levels of dental insurance among children in rural and remote areas create substantial barriers to accessing care. A marked inequality in insurance coverage also emerges between Indigenous and non-Indigenous children living in these communities[28,32,44,45].

Fear and anxiety

Fear and anxiety related to dental treatment, including the impact of previous traumatic dental experiences, commonly deter individuals in rural and remote communities from seeking care[24,27,31,32,36,39-42]. Similarly, fear of the unknown is associated with travelling outside the community for care[40]. Moreover, individuals from these areas expressed concerns about receiving care from inexperienced practitioners, posing an additional barrier[32,40].

Shame and embarrassment

Emotional barriers, including shame, embarrassment, and guilt among parents, who feel they have neglected their children's oral health, often hinder engagement with dental care[16,22,31,40].

Discussion

The current state of access to oral health services is shaped by a complex interplay of healthcare factors. To address this, our review synthesised the available evidence and categorised recurring themes related to barriers into four interconnected levels. System-level barriers included workforce shortages, limited service availability, geographic inaccessibility, and cost of services. At the policy level, disparities in funding models, fragmented services, lack of integration between oral health and general health services, lack of access to fluoridated water, and inconsistent eligibility criteria impede equitable access to dental services. Community-level barriers encompassed the unique cultural needs of Aboriginal and Torres Strait Islander patients and cultural mismatches between providers and patients, and the general lack of oral health promotions tailored to local contexts, which affected the whole community's confidence in the health system. Finally, individual-level barriers including low oral health literacy, financial hardship, low prioritisation of dental care, and feelings of shame and fear related to dental treatment directly influence care-seeking behaviour.

Importantly, these barriers are interrelated and reinforce one another. In response to this complexity, we first developed an ecological model to visually map the interconnected nature of these barriers. Building on this, we developed a conceptual model grounded in the ecological framework to present comprehensive, evidence-based solutions at each level (Fig4). Together, these models offer policymakers, service planners, and public health researchers a practical tool that illustrates access challenges and highlighting critical leverage points for intervention across different levels of influence, with the ultimate goal of improving oral health equity for children in rural and remote Australian communities.

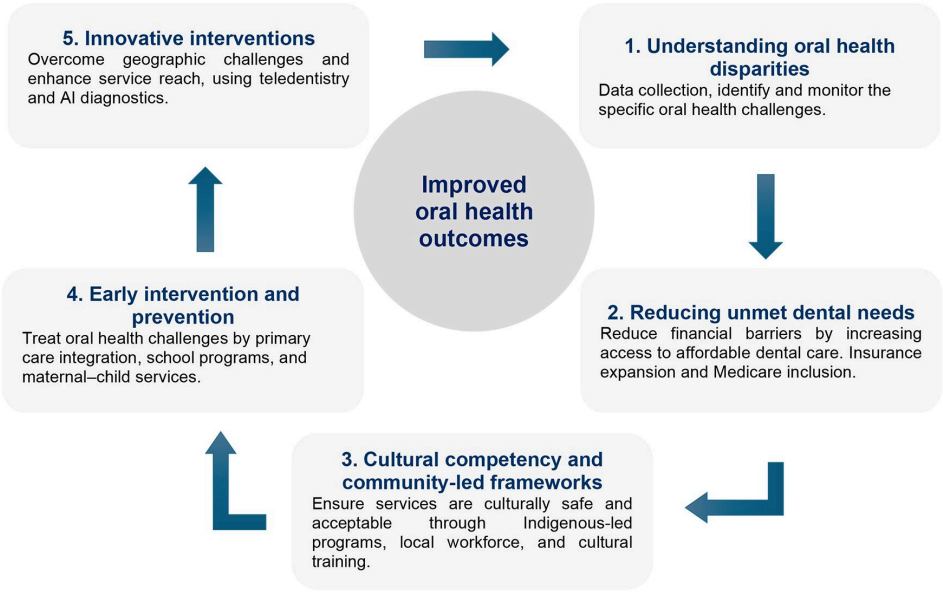

Figure 4: Conceptual model to improve oral health outcomes of children in rural and remote Australia.

Conceptual model to improve oral health outcomes for children living in rural Australia

Understanding oral health disparities

Understanding disparities in access to dental care is crucial in addressing gaps in oral health among rural and remote populations, particularly for children. Evidence indicated that paediatric oral health service requirements differ from adult care and therefore warrant specific consideration in service planning[44]. Children's oral health is shaped by the developmental stage of dentition and growth. Hence, paediatric models commonly emphasise prevention and early intervention, such as fluoride varnish, fissure sealants, and establishment of toothbrushing and dietary routines in early life to reduce future disease burden[44]. Studies also report that service delivery requires behaviour guidance and child-friendly approaches, with outcomes influenced

by the family/caregiver role, as parents/carers are central to consent, attendance, daily preventive practices, and follow-up[27,47,48].

Our review reveals that dental coverage and access in rural and remote Australia remain lower than in major cities, indicating a historical underservicing. Similar barriers are reported internationally, including higher poverty, lower rates of dental insurance coverage, geographic barriers, lack of water fluoridation, and fewer dentists available[49]. While rural health access issues are a global concern, Australia's large geographical distances and the sparse populations amplify these barriers. The unique interplay of these factors in the Australian context constitutes a distinct national challenge not consistently emphasised in international literature, requiring coordinated policy reform, innovative service delivery models, and community engagement for addressing rural oral health inequities and improving long-term outcomes for children.

Reduction in unmet dental needs

Reducing the prevalence of unmet dental needs requires policy-level interventions that expand financial access to oral health care. In rural Australia, the high cost of dental services, coupled with limited private dental insurance and restrictive public dental schemes, presents a significant barrier. Consequently, families postponed dental treatment, sometimes for several years[43]. As a result, minor dental issues inevitably worsen over time, ultimately leading to hospitalisation for more invasive treatment[45], resulting in significantly higher public healthcare expenses compared to early intervention[11]. In 2021–22, approximately 78,761 hospitalisations due to dental conditions could have been prevented. This hospitalisation rate was highest in children aged 5–9 years and among socially vulnerable children[6].

Expanding insurance coverage or expansion of existing schemes (eg enhancements to the Child Dental Benefits Schedule and the broader integration of comprehensive dental services into Medicare) could alleviate these financial burdens by reducing direct out-of-pocket costs. International evidence supports this, with Medicaid expansion in the US demonstrating improved dental care access for underserved populations[50]. However, while initiatives like the Child Dental Benefits Schedule have increased private dental service availability in Australia, eligible children in rural areas still face significant utilisation challenges[51]. These challenges include geographical isolation, limited awareness of financial support, and insufficient integration of culturally safe practices[51].

Culturally competent approaches

Included studies highlight the profound influence of the health profile, historical experiences, and cultural distinctiveness of Aboriginal and Torres Strait Islander populations. The delivery of dental care is frequently reported in the included studies as failing to align with the holistic principles central to Aboriginal and Torres Strait Islander culture, with services typically provided by non-Indigenous professionals who are not part of the communities they serve, leading to cultural disconnects, miscommunication, and a lack of trust[22,27,39]. Included qualitative and mixed-methods studies further describe how these experiences have shaped healthcare-seeking behaviours and contributed to pronounced disparities in access[24,35].

Similarly, culturally minoritised groups in countries such as the US, New Zealand, and Canada, experience a disproportionate burden of dental caries. In these settings, national public health initiatives have sought to reduce disparities through social support and culturally tailored approaches[52]. For example, evidence from Canada suggests that social support can play an important role in promoting oral health behaviours among culturally minoritised groups[53]. Across included studies, culturally competent care was emphasised as more than language translation; it requires attention to patients' lived experience, cultural beliefs, values, and social contexts[22,24,35]. Moreover, community engagement in the co-design and implementation of oral health programs, particularly for Aboriginal and Torres Strait Islander populations, has been reported as a strategy that may strengthen cultural competency and service acceptability[23-25]. In this context, oral health services and promotion programs targeting Aboriginal and Torres Strait Islander populations may benefit from collaboratively planned, implemented, and evaluated with the communities they aim to serve[23,25].

Early intervention and preventive care

The connection between oral conditions and other health diseases creates opportunities for oral healthcare messages to be part of primary health care[16]. Integrating oral health into primary health care offers a strategic approach to promoting early intervention and prevention, particularly in rural settings where children often have regular contact with GPs, nurses, and Aboriginal Health Workers[26]. International evidence supports interprofessional collaboration that expands preventive oral health activities among non-dental providers alongside appropriate reimbursement models. Notably in the US, North Carolina's reimbursement program for medical professionals providing preventive dental care for children led to a fourfold increase in preventive visits compared to dentist-only visits, and reduced inequalities in access[54].

Similarly, community-level paediatric prevention pathways, such as school-based oral health programs and mobile dental clinics, have improved access to preventive services for underserved children and may reduce disparities in dental care access[47]. To enable effective integration, health systems require supportive policy settings, aligned funding and incentives, workforce training and task shifting, updated clinical guidelines, and interoperable information systems, supported by effective referral and communication pathways between primary and dental care providers[26].

Innovative interventions

Innovative service models are crucial for overcoming the geographical barriers and workforce shortage in rural and remote communities[15,26,28]. Teledentistry can support remote triage, consultations, and follow-up[55]. Mobile dental units equipped with teledentistry capabilities have been successfully deployed in schools and community settings, reducing the need for long-distance travel and associated costs while improving access to preventive and basic restorative care, with evidence supporting the clinical effectiveness and economic efficiency of teledentistry[55]. In the US, school-based teledentistry programs in rural areas were able to deliver 97% of necessary treatments, halving the need for in-person dental visits[56]. High compliance with recommended follow-up care was also observed among paediatric patients in rural locations following teleconsultations[57]. These findings underscore the potential of teledentistry to extend specialist care into underserved areas, offering a solution to address persistent inequalities in access[15,26,28].

Strengths and limitations

This systematic review demonstrates several methodological strengths that enhance the robustness and reliability of its findings. First, the comprehensive literature search strategy ensured the inclusion of all relevant studies. Second, this integrative mixed-methods review, combining quantitative and qualitative evidence, delivers a richer, more nuanced understanding of the barriers. Third, the development of an ecological model to visualise how factors at the system, policy, community, and individual levels interact adds clarity to the complex, multi-level nature of access issues. Moreover, the subsequent construction of a conceptual model translates these insights into actionable, evidence-based strategies tailored to each barrier level.

This review also has important limitations. First, relatively few quantitative studies have specifically explored barriers to oral health service access among paediatric populations, limiting our ability to quantify the prevalence and relative weight of individual obstacles. Second, we found no studies that directly compared rural and urban children's experiences of accessing dental care, preventing empirical assessment of how geographic setting exacerbates or mitigates barriers. Third, substantial demographic heterogeneity and limited disaggregation across included studies, particularly inconsistent reporting by age group, gender, and Indigeneity, restricted subgroup comparison.

Conclusion

The findings of this systematic review indicate that children in rural and remote communities have historically experienced myriad challenges in accessing oral health services. This synthesis highlights the complex, interrelated nature of multi-level barriers, indicating that isolated interventions targeting individual barriers are unlikely to succeed. Instead, a comprehensive, multi-level and multisectoral approach is essential. Enhancing service availability and accessibility must be accompanied by efforts to address broader social determinants of health, including education, housing, nutrition, and social support. Interdisciplinary collaboration among healthcare providers, policymakers, community leaders, Aboriginal Health Workers, and other stakeholders is critical to developing sustainable, culturally appropriate, and community-driven solutions.

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Conflicts of interest

The authors have no conflict of interest to declare.

AI disclosure statement

Generative AI was used solely as a language editing aid. ChatGPT (OpenAI, GPT-5.2) was used to paraphrase and refine the wording of a limited number of sentences. No AI tools were used for literature screening, data extraction, risk-of-bias assessment, synthesis, statistical analysis, interpretation of results, or figure/table generation, and no synthetic data or images were produced. All AI-assisted text was reviewed, edited, and verified for accuracy by authors, who take full responsibility for the content.

Data availability

Extracted data are available from the corresponding author on request.

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